

WHAT IS CLAIMED IS:

1. A method of broadening a dynamic range of a solid-state image sensor including photosensitive cells, each being made up of a main region and a subregion respectively provided with higher and lower photosensitivity, and allowing signal charges to be read out from the main region and the subregion separately, comprising the steps of:

reducing a quantity of light to be incident on each photosensitive cell;

reading out a signal charge from the main region of the photosensitive cell under a reduced quantity of incident light;

digitizing the signal charge read out from the main region and writing a resulting digital signal to two memories;

amplifying digital signals written to the two memories with different gains; and

combining two kinds of digital signals amplified;

whereby the dynamic range of the solid-state image sensor is broadened by use only of the main region.

2. The method in accordance with claim 1, wherein said step of reducing the quantity of light comprises a substep of reducing a shutter speed of the solid-state image sensor.

3. The method in accordance with claim 1, wherein said step of reducing the quantity of light comprises a substep of varying an F number of the solid-state image sensor.

4. The method in accordance with claim 1, wherein said step of reading the signal charge comprises a substep of reading out the signal charges from the main region and the subregion while mixing the signal charges together.

5. A method of broadening a dynamic range of a solid-state

image sensor including photosensitive cells, each being made up of a main region and a subregion respectively provided with higher and lower photosensitivity, and allowing signal charges to be read out from the main region and the subregion separately, comprising the steps of:

reducing a quantity of light to be incident on each photosensitive cell;

reading out a signal charge from the main region of the photosensitive cell under a reduced quantity of incident light;

amplifying, at an analog stage, the signal charge read out with different gains to thereby generate a high gain-up signal and a low gain-up signal;

digitizing the high gain-up signal and the low gain-up signal; and

combining the high gain-up signal with the low gain-up signal digitized;

whereby the dynamic range of the solid-state image sensor is broadened by use only of the main region.

6. The method in accordance with claim 5, wherein said step of reducing the quantity of light comprises a substep of reducing a shutter speed of the solid-state image sensor.

7. The method in accordance with claim 5, wherein said step of reducing the quantity of light comprises a substep of varying an F number of the solid-state image sensor.

8. The method in accordance with claim 5, wherein said step of reading the signal charge comprises a substep of reading the signal charges of the main region and the subregion while mixing the signal charges together.

9. A method of broadening a dynamic range of a solid-state

image sensor including photosensitive cells, each being made up of a main region and a subregion respectively provided with higher and lower photosensitivity, and allowing signal charges to be read out from the main region and the subregion separately, comprising the steps of:

- reducing a quantity of light to be incident on each photosensitive cell;

- calculating a preselected estimated value from a luminance distribution of a scene; and

- selecting, in accordance with the estimated value, one of a step of reading out signal charges from the main region and the subregion separately, a step of reading out the signal charge only from the main region, and a step of reading out the signal charges of said main region and the subregion while mixing the signal charges together;

whereby the dynamic range of the solid-state image sensor is broadened.

10. The method in accordance with claim 9, wherein said step of reading out the signal charge only from the main region comprises the substeps of:

- digitizing the read-out signal charge; and
- amplifying the signal charge digitized.

11. The method in accordance with claim 9, wherein said step of reading out the signal charge only from the main region comprises the substeps of:

- digitizing the read-out signal charge;
- storing the signal charge digitized in two memories;
- amplifying the digital signals stored in the two memories with different gains; and
- combining the digital signals amplified.

12. The method in accordance with claim 9, wherein said

step of reading out the signal charge only from the main region comprises the substeps of:

amplifying the read-out signal charge at an analog stage; and

digitizing the signal charge amplified.

13. The method in accordance with claim 9, wherein said step of reading out the signal charge only from the main region comprises the substeps of:

amplifying the read-out signal charge at an analog stage with different gains to thereby generate a high gain-up signal and a low gain-up signal;

digitizing the high gain-up signal and the low gain-up signal; and

combining the high gain-up signal with the low gain-up signal digitized.

14. The method in accordance with claim 9, wherein said step of reading out the signal charges from the main region and the subregion while mixing the read-out signal charges together comprises the substeps of:

digitizing the mixed signal charge; and

amplifying the digitized signal charge.

15. The method in accordance with claim 9, wherein said step of reading out the signal charges from the main region and the subregion while mixing the read-out signal charges together comprises the substeps of:

digitizing the mixed signal charge;

storing the digitized signal charge in two memories;

amplifying digital signals stored in the two memories with different gains; and

combining the digital signals amplified.

16. The method in accordance with claim 9, wherein said step of reading out the signal charges from the main region and the subregion while mixing the signal charges together comprises the substeps of:

amplifying the mixed signal charge at an analog stage;  
and  
digitizing the mixed signal charge.

17. The method in accordance with claim 9, wherein said step of reading out the signal charges from the main region and the subregion while mixing the signal charges together comprises the substeps of:

amplifying the mixed signal charge at an analog stage with different gains to thereby generate a high gain-up signal and a low gain-up signal;

digitizing the high gain-up signal and the low gain-up signal; and

combining the high gain-up signal with the low gain-up signal digitized.

18. The method in accordance with claim 9, wherein said step of reducing the quantity of light comprises a substep of reducing a shutter speed of the solid-state image sensor.

19. The method in accordance with claim 9, wherein said step of reducing the quantity of light comprises a substep of varying an F number of the solid-state image sensor.